REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

By the present amendment, independent claims 1, 36 and 65 have been amended to include the limitations of their respective dependent claims 6, 41 and 70, which have been cancelled. The dependencies of claims 7, 42 and 71 have been amended to reflect the cancellation of claims 6, 41 and 70. Accordingly, claims 1-5, 7-40, 42-69 and 71-95 are presently pending, and favorable reconsideration thereof is respectfully requested. Claims 1, 36 and 65 are the independent claims, while claims 94 and 95 are cast in a quasi-independent form.

Allowable Subject Matter

Applicant wishes to thank the Examiner for the indication that claims 13-23, 25, 26, 30-35, 48-56, 58, 62, 63, 77-85, 87, 91 and 92 would be allowable if rewritten in independent form.

Title of Invention

The Examiner has stated that the title of the invention is not descriptive, and that a new title is required that is clearly indicative of the invention to which the claims are directed.

By the present amendment, the title of the invention has been amended to recite, "METHODS AND APPARATUS FOR MANAGING ENERGY SUPPLIED BY AN ENERGY SUPPLY". The amended title corresponds directly to the wording of the preambles of independent claims 1, 36 and 65, and is therefore indicative of the

invention to which the claims are directed. Applicant therefore respectfully submits that this ground of objection has been overcome.

35 U.S.C. § 102(b)

The Examiner has rejected claims 1-3, 6-9, 28, 29, 36-38, 41-44, 60, 65-67, 70-73 and 89 under 35 U.S.C. § 102(b) as being anticipated by PCT Publication No. WO 02/081255 ("Dasgupta").

Applicant respectfully notes that the Dasgupta reference does not appear to be citable under 35 U.S.C. § 102(b), as its October 17, 2002 publication date is less than one year before the June 27, 2003 international filing date of the present application, which is deemed to be the U.S. filing date of the present application by virtue of 35 U.S.C. § 363. To advance the prosecution of this application, Applicant is prepared to address the Dasgupta reference on its merits, assuming for the sake of the present response that either the Dasgupta reference or its U.S. non-provisional priority application no. 10/106,782 (published October 10, 2002) is citable under 35 U.S.C. § 102(e), but without admitting such citability or otherwise waiving the Applicant's right to attempt to swear behind the Dasgupta reference to defeat its citability, if factually appropriate.

Applicant respectfully submits that the Dasgupta reference fails to satisfy the requirements for a finding of anticipation of claim 1 as presently amended. In this regard, the standard for an anticipation rejection under 35 U.S.C. §102 has been well established by the Court of Appeals for the Federal Circuit, and is concisely summarized in M.P.E.P. § 2131:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). ... "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v.*

Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). ...

By the present amendment, independent claim 1 has been amended to include the limitations of dependent claim 6. Thus, amended claim 1 recites:

1. (Currently amended) An apparatus for managing energy supplied by an energy supply, the apparatus comprising:

a) an energy accumulation device comprising:

i) an energy accumulator, <u>comprising a first energy accumulator for accumulating energy during a first cycle, and a second energy accumulator for accumulating energy during a second cycle</u>; and

ii) a controller configured to place the energy accumulator in electrical communication with the energy supply and with a load; and

b) an energy transfer device in communication with the energy accumulation device and with the energy supply and configured to transfer accumulated energy from the energy accumulator to the energy supply.

Dasgupta discloses an energy storage device employing a hybrid battery to provide variable power rates to an electrical load, such as an electric motor or engine utilized to drive a motor vehicle. (Dasgupta, page 1, lines 7-9). Generally, Dasgupta seeks to provide a battery system that overcomes the different disadvantages that arise from lead-acid batteries and from lithium-based batteries.

In this regard, lead-acid batteries are advantageous for use in motor vehicles because they can provide large electrical currents and large bursts of power, which are required to accelerate the vehicle. However, they are disadvantageous because they have a low energy density and low specific energy, as a result of which a lead-acid battery of a given energy capacity must have a relatively large mass and large volume. (Page 1, lines 18-26 and page 2, lines 15-18).

Conversely, lithium batteries tend to have higher energy densities and higher specific energy than lead-acid batteries, with the result that a lithium battery can typically store the same amount of energy in a smaller mass and volume than a lead-acid battery. However, lithium batteries are generally not capable of providing the same large currents and bursts of power as lead-acid batteries, due to their intrinsically higher impedance. Attempts have been made to redesign lithium batteries to provide larger currents, but these attempts have resulted in lower energy densities and lower specific energies, which would result in larger and more massive batteries being required to store a given amount of energy (or alternatively, less energy being stored in a battery of a given size and mass), thereby eroding the advantage of lithium batteries over lead-acid. (Page 1, line 28 – page 2, line 21).

To address these difficulties, Dasgupta seeks to provide an efficient energy storage device for use in large load situations such as an electrical motor vehicle, having a high specific energy and high energy density, while still being capable of providing large bursts of power. To achieve this, Dasgupta provides an energy storage device 15 comprising an energy battery 20 and a power battery 30. The power battery 30 is connected to the load, namely, a motor 100, to drive the motor. In order to provide the necessary high bursts of power to the motor 100 to accelerate the vehicle, the power battery 30 is a lead-acid battery or other battery capable of producing such high bursts of power, such as nickel-based batteries. The energy battery 20 is connected to the power battery 30 through a switch 26 and is used to continuously recharge the power battery 30 under the direction of a controller 60. The energy battery is a lithium battery, designed to store a large amount of electrical

energy, and having a higher energy density than the power battery 30. (Page 4, lines 3-7; page 9, line 28 – page 10, line7; page 10, lines 20-23 and 28-30; page 11, lines 9-11; page 12 lines 27-31).

Thus, during operation, the lead-acid power battery 30 powers the motor 100, while the lithium energy battery 20 continuously recharges the power battery 30. To recharge the two batteries, a recharger 50 can receive power from external power sources 8 such as hydro mains, and is capable of recharging both the energy battery 20 and the power battery 30 simultaneously, under the direction of the controller 60. (Page 10, lines 4-7; page 14, lines 1-31).

With reference to former claim 1 of the present application, the Examiner has expressed the view that both the energy battery 20 and the power battery 30 of Dasgupta are examples of "energy accumulators" as recited in Applicant's claims. The Examiner has not specifically identified the structure of Dasgupta that the Examiner believes to correspond to the "energy supply" recited in claim 1; Applicant respectfully assumes that the Examiner viewed the external power sources 8, in combination with the recharger 50, as the "energy supply". However, under this interpretation, Dasgupta fails to disclose or suggest,

> "an energy transfer device in communication with the energy accumulation device and with the energy supply and configured to transfer accumulated energy ***from*** the energy accumulator ***to*** the energy supply"

as recited in amended claim 1. In this regard, Dasgupta fails to disclose or suggest any capability to transfer energy from the batteries 20 and 30 to the recharger 50 or the external power sources 8. Rather, it appears that the power flow in Dasgupta is strictly in the opposite direction, from the external power sources 8 and recharger 50 to the batteries 20 and 30. Thus, although it is possible that Dasgupta may disclose transfer of energy from an energy supply to an energy accumulator, Dasgupta fails to

disclose or suggest any transfer of energy in the opposite direction, "from the energy accumulator to the energy supply", as recited in amended claim 1.

It has occurred to the Applicant that an alternative interpretation of Dasgupta may be possible, and that the power battery 30 may be compared to an "energy accumulator" while the energy battery 20 may be compared to an "energy supply". Although the energy battery 20 continuously recharges the power battery 30 during operation, Dasgupta discloses that the switch 26 between the two batteries could also permit power flow in the opposite direction, allowing the power battery 30 to recharge the energy battery 20 if, for example, the power battery 30 becomes overcharged by a regenerative braking system 90. (Page 13, lines 25-28.) However, under this alternative interpretation, Dasgupta fails to disclose or suggest,

> "an energy accumulator, comprising a first energy accumulator for accumulating energy during a first cycle, *and* a second energy accumulator for accumulating energy during a second cycle",

as recited in amended claim 1. In this regard, if the power battery 30 is compared to the claimed "energy accumulator" and the energy battery 20 is compared to the claimed "energy supply", then Dasgupta would disclose only a single energy accumulator, and fails to disclose first and second energy accumulators as recited in amended claim 1. Dasgupta also fails to disclose first and second cycles as recited in amended claim 1, and does not, for example, alternate the roles of the batteries 20 and 30 in successive cycles.

In summary, therefore, according to the Examiner's interpretation of Dasgupta, in which the Examiner has compared both the batteries 20 and 30 to the "energy accumulator" recited in claim 1, Dasgupta fails to disclose or suggest, "an energy transfer device in communication with the energy accumulation device and with the energy supply and configured to transfer accumulated energy ***from*** the energy accumulator ***to*** the energy supply", as recited in amended claim 1.

Conversely, according to the alternative interpretation of Dasgupta suggested above, if the power battery 30 is compared to the claimed "energy accumulator" and the energy battery 20 is compared to the claimed "energy supply", then Dasgupta fails to disclose or suggest, "an energy accumulator, comprising a first energy accumulator for accumulating energy during a first cycle, *and* a second energy accumulator for accumulating energy during a second cycle", as recited in amended claim 1. Therefore, according to either of these possible interpretations, Dasgupta fails to satisfy the above-noted requirements for a finding of anticipation of amended claim 1. Applicant therefore respectfully submits that the rejection of claim 1 has been overcome.

Applicant also respectfully notes in passing that the Dasgupta reference addresses an entirely different problem than the present application, and fails to provide any of the advantages of the present application. Dasgupta addresses the specific problem of the relatively low energy density and low specific energy, and hence the relatively large mass and volume, of battery systems that are capable of providing large bursts of power such as those required to propel an electric motor vehicle. (Page 1, line 18 – page 2, line 21.) Dasgupta is concerned with reducing the size and mass of such battery systems, while preserving the ability to generate the necessary large bursts of energy. By way of example, Dasgupta purports to have successfully replaced a conventional automotive lead battery bank weighing 532 kg and occupying 225 liters with a novel energy battery / power battery pair having a total mass and volume of only 210 kg and 110 liters. (Page 18, lines 5-8 and page 19, lines 22-24.) The solution taught by Dasgupta is intended only for "relatively large load situations, such as for an electrical vehicle", and appears to be limited to a combination of two different types of energy storage device, one having a greater energy density than the other. (Page 4, lines 3-7 and page 20, line 24 – page 21, line 8.) In contrast, the present application discloses illustrative embodiments of energy management apparatus and methods having broad-ranging general application. Unlike Dasgupta, the energy management apparatus and methods of illustrative embodiments of the present application are not limited to large

or variable loads, and can be advantageously used with virtually any type of electrical energy supply, regardless of whether the energy supply is capable of supplying large bursts of energy, and regardless of the size, mass, type, energy density or specific energy of the energy supply. For example, with reference to the official publication no. US 2007/0170891 of the present application, paragraph [0058] notes that different types of loads may be used, paragraph [0059] notes that any device capable of applying an electromotive force can be used as the energy supply, and paragraph [0135] explains how alternating current energy supplies may be substituted for direct current energy supplies. Applicant respectfully submits that the failure of the Dasgupta reference to provide any of the advantages of the present application further strengthens the patentable distinction of the present claims over Dasgupta.

With respect to the remaining claims rejected under 35 U.S.C. § 102, as noted above, claims 6, 41 and 70 have been cancelled.

By the present amendment, independent claims 36 and 65 have been amended to recite limitations similar to those discussed above in connection with amended claim 1. Applicant therefore respectfully submits that amended claims 36 and 65 are allowable for reasons including those presented above in connection with amended claim 1.

Claims 2, 3, 7-9, 28 and 29 are directly or indirectly dependent upon amended claim 1. Claims 37, 38, 42-44 and 60 are directly or indirectly dependent upon amended claim 36. Claims 66-67, 71-73 and 89 are directly or indirectly dependent upon amended claim 65. Applicant therefore respectfully submits that these claims are allowable due to their dependencies, as well as the additional subject-matter that each of these claims recites.

35 U.S.C. § 103(a)

The Examiner has rejected claims 4, 5, 10, 11, 12, 24, 27, 39, 40, 45-47, 57, 59, 61, 64, 68, 69, 74-76, 86, 88, 90 and 93-95 under 35 U.S.C. § 103(a) as being unpatentable over Dasgupta.

Claims 4, 5, 10, 11, 12, 24 and 27 are directly or indirectly dependent upon amended claim 1. Claims 39, 40, 45-47, 57, 59, 61 and 64 are directly or indirectly dependent upon amended claim 36. Claims 68, 69, 74-76, 86, 88, 90 and 93 are directly or indirectly dependent upon amended claim 65, and claims 94-95 also effectively incorporate the limitations of amended claim 65. As Applicant respectfully believes amended claims 1, 36 and 65 to have been shown to be allowable under the previous heading, Applicant respectfully submits that claims 4, 5, 10, 11, 12, 24, 27, 39, 40, 45-47, 57, 59, 61, 64, 68, 69, 74-76, 86, 88, 90 and 93-95 are allowable due to their dependencies, as well as the additional subject-matter that each of these claims recites.

Notification of Foreign Prosecutions

Applicant has filed corresponding patent applications in Brazil, Canada, the European Patent Office, India, and Mexico. Thus far, the only foreign Office Action received has been from Mexico, in which the Examiner has raised an initial objection based upon the same Dasgupta reference cited in the present U.S. Office Action. To the applicant's knowledge, no new prior art references have been cited thus far in Mexico or any other foreign prosecution. Applicant has not submitted to the USPTO a copy of the Mexican Office Action itself, which is not believed to be material to patentability of the present U.S. application. Nevertheless, if the Examiner would like to receive copies of foreign Office Actions, the Examiner is respectfully requested to contact the undersigned attorney.

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance, and respectfully requests that a Notice of Allowance be issued. Should there be any questions concerning this application, the Examiner is respectfully invited to contact the undersigned attorney at the telephone number appearing below.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, Order No. S&B1-38785.

Respectfully submitted,

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